

Notice of Allowability

Application No.

10/663,752

Examiner

Alan Diamond

Applicant(s)

DEN, TOHRU

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the after-final amendment filed November 23, 2005.
2. ☒ The allowed claim(s) is/are 42 and 44-50.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/665,983.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

The application has been amended as follows:

In The Claims

In claim 49, at line 15, the word "and" between the words "first" and "second" is difficult to read, probably due to faxing, photocopying and/or scanning. Please delete the difficult to read "and" which appears between the words "first" and "second" and insert in its place --and--. No extension of time is needed for this amendment since this is merely for clarification of what was already correct.

2. The following is an examiner's statement of reasons for allowance: The photoelectric conversion devices in instant independent claims 42, 49, and 50 require, for example, that the first charge transfer region is for accepting electrons from the light absorption region, the second charge transfer region is for donating electrons to the light absorption region, the light absorption region is positioned between the charge transfer regions, the light absorption region is a semiconductor, and either of the first and second charge transfer regions is a semiconductor acicular crystal region comprising an aggregate of acicular crystals, wherein the acicular crystals comprise a metal oxide. In the dye-sensitized photoelectric conversion device in the claims of Den et al (U.S. Patent 6,649,824), there are first and second charge transfer layers, and a

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light absorption layer therebetween, but there is no teaching of the light absorption layer being a semiconductor. In the art, the light absorption layer in a dye-sensitized photoelectric conversion device is generally some type of dye or coloring material, not a semiconductor. Skotheim (U.S. Patent 4,190,950) does not solve this deficiency in the claims of Den et al since the cells 10, 10', 10'', and 10''' in Figure 3 of Skotheim are isolated, stacked cells that are separated by insulating spacers (26). The dye in each cell is the light absorption layer for the respective cell. The semiconductor in any one of the cells 10, 10', 10'', and 10''' is not a semiconductor for any other cell. Accordingly, the obviousness-type double patenting rejection over the claims of Den et al in view of Skotheim is moot. Likewise, the provisional obviousness-type double patenting rejection over claims 11 and 12 of copending application 09/959,177 in view of Skotheim is moot in view of the lack of a teaching of a semiconductor light absorption layer in said claims 11 and 12, and in view of Skotheim's insulation between cells. Zinc oxide, which is used in claim 11 of said copending application, has generally be used as a semiconductor in dye-sensitized solar cells wherein the dye is the light absorption layer, or has been used as a transparent conductive layer. Even if the provisional obviousness-type double patenting rejection was still proper (the Examiner maintains that it is not), then, in accordance with MPEP 822.01, this provisional rejection is expressly withdrawn by the Examiner since it is the only issue remaining in the instant application.

Sakurai et al (U.S. Patent 6,310,282) shows stacked dye-sensitized cells in Figures 5, 14, and 18. In Figures 5 and 18, the separation between the cells is with a

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transparent substrate such as glass or plastic (see col. 11, lines 19-20). A skilled artisan would use insulting glass or plastic as the substrate, as is used by Skotheim, which is discussed above. In Sakurai et al's Figure 14, the dye layers (5, 6) are the light absorbing layers. Layer (9) a charge transfer layer (carrier transport layer), and layers (3, 4) can be metal oxide (but there is no teaching of the instant acicular crystal). An example of layer (9) would be, for example, the acetonitrile/iodine/ethylene carbonate carrier transport material, which is not a semiconductor (see col. 8, lines 38-40; and Examples 1 and 3). Other carrier transport materials are given at col. 12, line 12 through col. 14, line 45, and there is no requirement that the carrier transport material be a semiconductor. Indeed, many of the materials listed by Sakurai et al are electrically conductive, but not semiconductors. Furthermore, even if Sakurai et al's carrier transport layer did absorb some light and was a semiconductor, it would not be recognized by a skilled artisan as being the light absorption region between charge transfer regions, as here claimed. A skilled artisan would recognize Sakurai et al's dye layers as being the light absorption region.

The photovoltaic cell of Han (U.S. Patent 6,150,605) has oxide semiconductors (3, 7), dye layers (4, 6) and electrically conductive layer (5) (see Han's Figure 1). Like Sakurai et al, the electrically conductive layer (5) of Han is not required to be a semiconductor, and many of the electrically conductive materials listed by Han are electrically conductive, but not semiconductors. As with Sakurai et al, a skilled artisan would recognize Han's dye layers (4, 6) as constituting the light absorption regions of

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the device, not the electrically conductive layer (5), regardless of whether or not electrically conductive layer (5) is semiconductive.

U.S. Patents 5,482,570 and 6,300,559, and U.S. Patent Application Publication US 2004/0157354, are hereby made of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
November 28, 2005

A handwritten signature in black ink, appearing to read 'Alan Diamond', is written over the printed name and title.